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IS 8599 (1977): Recommendations for selection of apron conveyors [MED 6: Continuous Bulk Conveying, Elevating, Hoisting Aerial Ropeways and Related Equipment]

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“Knowledge is such a treasure which cannot be stolen”



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Indian Standard
**RECOMMENDATIONS FOR
 SELECTION OF APRON CONVEYORS**

1. Scope — Lays down the recommendations for the selection of apron conveyors commonly used for handling heavy lumpy or abrasive materials such as coal, stone, gravel, run of the mine ore, etc.

1.1 This standard is applicable to apron conveyors handling ores up to a capacity of 250 t/h.

2. Application — Apron conveyors are used extensively in modern mining, manufacturing and processing industries. Heavy duty apron feeders are used directly under dump hoppers to feed run of the mine ores to crusher and have reinforced pans to take the shock of falling lumps. Apron conveyors may be either horizontal or inclined. Apron conveyors usually operate at slow speeds without any appreciable vibration and as such minimum lump breakage.

3. Construction — Apron conveyors consist primarily of a series of overlapping steel pans or buckets carried on two or more endless strands of conveyor chains. Some type of pans have overlapping side plates added to confine the load.

4. Capacities — Apron conveyors are in operation handling up to 3 000 t/h and there is no practical difficulty in the way of even larger capacities. However, this standard is applicable to apron conveyors up to a capacity of 250 t/h. Maximum capacities are obtained by using skirt boards, 300 mm to 1 200 mm in height to increase the depth of the material in the pan. However, these are not suitable for long conveyors.

4.1 The volumetric capacity of an apron conveyor depends on width, depth and speed of the moving stream of material and in some cases on the slope and the type of pan. The width and depth of material is governed by the maximum size of lumps to be conveyed as given in Table 1.

TABLE I RECOMMENDED LUMP SIZE FOR CONVEYORS

All dimensions in millimetres.

Width Between Skirt Boards	Lump Size	
	Average	Maximum
450	75	150
600	100	200
750	150	300
900	200	400
1 000	250	500
1 200	300	600
1 400	350	700
1 600	400	800
1 800	450	900

5. Speed of Conveyor — The speed of the conveyor varies with the class of service and the type of pans. For feeders drawing material from bins or hoppers the speed is usually kept under 10 m/min. Longer conveyors receiving fed loads may be operated at higher speeds of 18 to 30 m/min or more depending on the chain, pitch and number of teeth on the sprocket. Conveyors for picking tables and sorting services are usually operated at 10 to 20 m/min.

6. Apron Pan Thickness — Recommended metal thickness of apron pans for various conditions are as follows:

Apron Pan Thickness	For Handling
mm	
5	Light weight materials that are only mildly abrasive and where corrosion is not a factor to be considered
6 or 8	Medium weight materials with probable corrosion and abrasion considerations. Also where moderate impact is to be encountered
10 or 12	Heavy weight materials which are abrasive and corrosive. Also where impact is severe
16 and above	Extra heavy weight materials which are highly abrasive and corrosive. Also where impact is highly severe

7. Chain Link Attachments — Chain link attachments are links having suitable lugs with holes to which apron pans are fastened. The three most common attachments are the following.

7.1 The 'A' attachment where the attachment is only on one side of the chain link. This causes a concentration of load on one line of side bar resulting in a tendency of the chain to tip towards the loaded side and misalignment of chain rollers. When 'A' type attachments are used it is recommended that the factor of safety for chain selection should be double the normal one.

7.2 The 'K' attachment where symmetrical attachments are provided on both side bars of the chain link. This provides equal distribution of load on the chain with better alignment of chain rollers.

7.3 The equalizing saddle attachment where outload rollers and rigid through rods are employed to permit use of full allowable chain working tension in design. Minimum maintenance is incurred by the large diameter low rolling friction on out-board rollers, longer chain life and accessibility of parts. Out-board rollers and sleeves on which they rotate may be replaced without uncoupling the chain.

8. Skirt Plate — Stationary plates which confine the material when deep loads are carried on a conveyor are called skirt plates. Generally the skirt plates are attached to the frame of the conveyors. The height of skirt varies between 300 to 1200 mm. A general rule to follow for determination of the height of skirt plate is:

$$\text{Depth of material} = \frac{2}{3} \text{ skirt plate height.}$$

9. Selection — Table 2 gives a convenient reference for selection of apron pans. The various materials listed are only a very few of those frequently encountered in material handling. For materials having similar characteristics Table 2 may be used as a guide.

TABLE 2 SELECTION OF APRON PANS

Material Handled	Style of Apron Pan*					
	A	B	C	D	E	F
Castings	x					
Cement clinker:						x
Hot						
Crushed	x		x			
Clay:						
Bank run	x		x		x	
Coal:						
Mine run			x	x	x	
Sized	x		x			x
Lignite	x		x			
Coke:						
Lumps	x					
Fines	x		x			
Corrosive						x
Cullet:						
Glass	x					
Earth:						
Common loam	x					
Lumps	x		x	x	x	
Gravel:						
Bank run	x	x	x	x		
Sized	x	x	x		x	
Hot:						x
Extreme						x
Mild	x	x	x	x		

(Continued)

TABLE 2 SELECTION OF APRON PANS — *Contd*

Material Handled	Style of Apron Pan*					
	A	B	C	D	E	F
Lime Stone:						
Quarried	x					
Sized	x					
Ore:						
Light	x	x	x	x	x	
Heavy	x	x	x	x	x	
Rock:						
Lump, large		x	x	x		
Sized	x	x	x	x		
Sand:						
Dry	x	x	x	x		
Hot			x	x		x
Slag:						
Furnace	x	x	x	x		
Granulated	x	x	x	x		
Stone:						
Lump, large	x	x	x	x	x	
Sized	x	x	x	x	x	

*See IS : 7423-1974 'Dimensions for apron conveyors'.